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Differences in administration of influenza vaccine to elderly adults by physician sex, 2006-2016

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Introduction

Female physicians spend more time with patients during outpatient visits than their male counterparts.[1] Some of this difference may be due to differences by physician sex in time spent on patient counseling,[2] including discussions about vaccinations, such as influenza vaccination. The influenza vaccination rate among minority patients, particularly Black patients, is significantly lower than among white patients,[3] and more time may be needed with minority patients to discuss vaccine concerns. Using nationwide Medicare data, this study estimated differences in influenza vaccination rates by patient race and sex between patients of female and male physicians working in the same outpatient practice.

Methods

This study used 2006-2016 claims data for a 20% sample of Traditional Medicare beneficiaries 65 and older. Patients were assigned to an outpatient physician each year according to previously-used algorithms based on plurality of outpatient evaluation and management visits.[4] Because influenza vaccinations were studied, year was defined from September to the following August. Beneficiaries continually enrolled during a year were included. This study examined the binary outcome of influenza vaccination, defined by claims with a corresponding CPT code (eTable 1 in Supplement). Eight patient race-sex subgroups were examined: white men, white women, Black men, Black women, Asian men, Asian women, Hispanic men, and Hispanic women. Physician sex and medical school graduation year were obtained from the Physician Compare National file. Patients enrolled more than one year contributed multiple patient-year observations.

A multivariable linear regression was performed for the outcome as a function of physician sex, patient race-sex subgroup, and the interaction between the two, also controlling for patient age, Medicaid dual-eligibility, Part D low-income subsidy receipt, original reason for Medicare being disability, Elixhauser co-morbidity score,[5] number of years a patient had a physician as outpatient provider, physician graduation year, patient zip code, and year. Fixed effects for outpatient practices, identified by unique combinations of tax identification numbers and provider zip code, were included to make within-practice comparisons between female and male physicians. Analyses were conducted using Stata 16.1. The IRB of the National Bureau of Economic Research, where the data were housed and analyzed, approved the study and waived informed consent due to deidentified data use. P-values were from 2-sided tests.

Results

The sample included 144,746 female physicians with 8,193,448 patient-year observations and 303,939 male physicians with 29,909,908 patient-year observations (eTable 2 in Supplement). Adjusting for patient characteristics only, Black patients were 13.5 percentage points (95% CI -13.6 to -13.4) less likely and Hispanic patients 4.6 percentage points (95% CI -4.8 to -4.5) less likely than white patients to be vaccinated, while Asian patients were 2.3 percentage points (95% CI 2.0 to 2.5) more likely to be vaccinated (results not shown). After also adjusting for physician characteristics, patients of female physicians were more likely than patients of male physicians in the same outpatient practice to be vaccinated across all 8 race-sex subgroups (Figure 1). For example, the difference by physician sex in

vaccination rates was 1.7 percentage points (95% CI 1.4 to 2.1) among Black male patients and 1.6 percentage points (95% CI 1.1 to 2.1) among Hispanic male patients. This represents about 10 percent of the Black-white gap and about 30 percent of the Hispanic-white gap in influenza vaccination rates. Female physicians were more likely than male physicians working in the same practice to get their sicker patients vaccinated (Figure 2). In adjusted analysis, female physicians had fewer outpatient visits in a year per patient than their male counterparts (3.56 vs. 3.62; difference -0.06 [95% CI -0.07 to -0.05]) (results not shown).

Discussion

Among Medicare patients, patients of female physicians were more likely than patients of male physicians in the same practice to receive the influenza vaccine. These vaccination differences represent a large percentage of Black-white and Hispanic-white gaps in vaccination rates. These differences may reflect known differences in time spent with patients.[1] They may also reflect known differences in communication style.[6] These results do not exclude the possibility that patients who choose a female physician are different in other ways that make them more likely to be vaccinated. Limitations include inability to record vaccinations not reimbursed by Medicare. Understanding contributors to these vaccination differences may provide insights into improving vaccination efforts for influenza and other diseases, particularly among minority patients.

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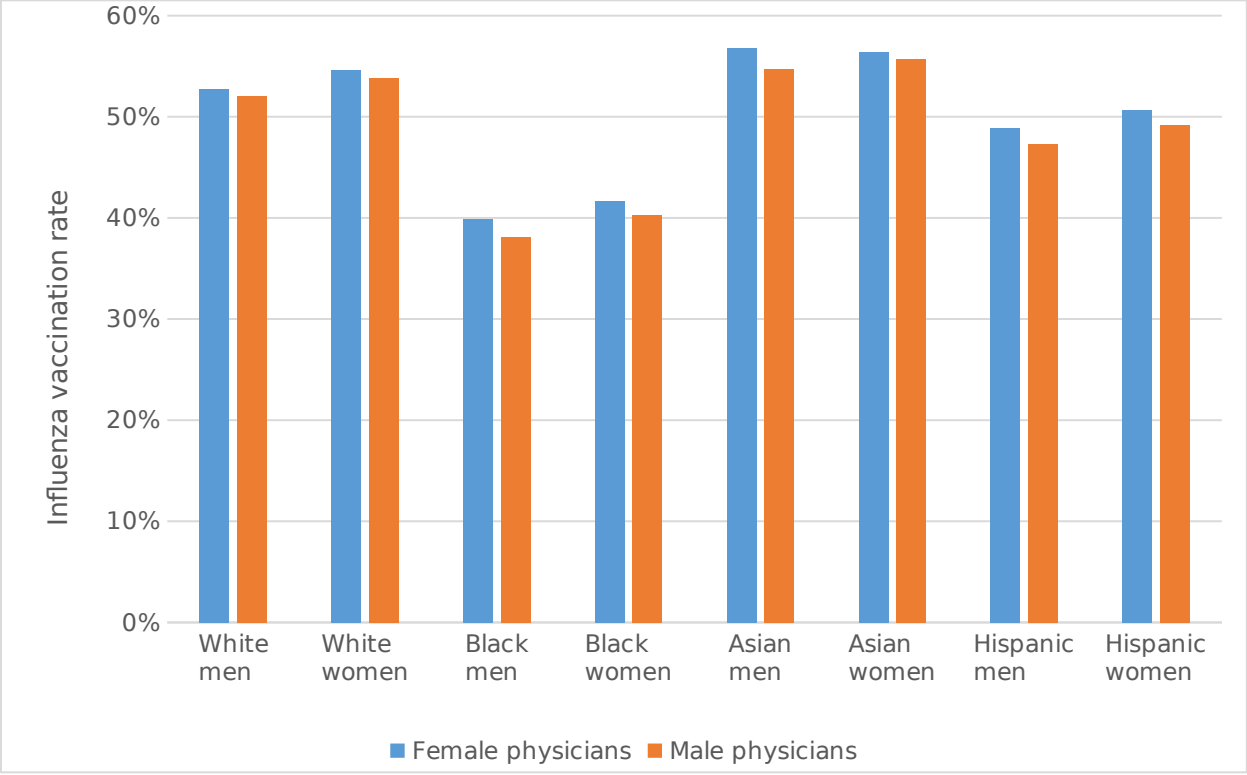
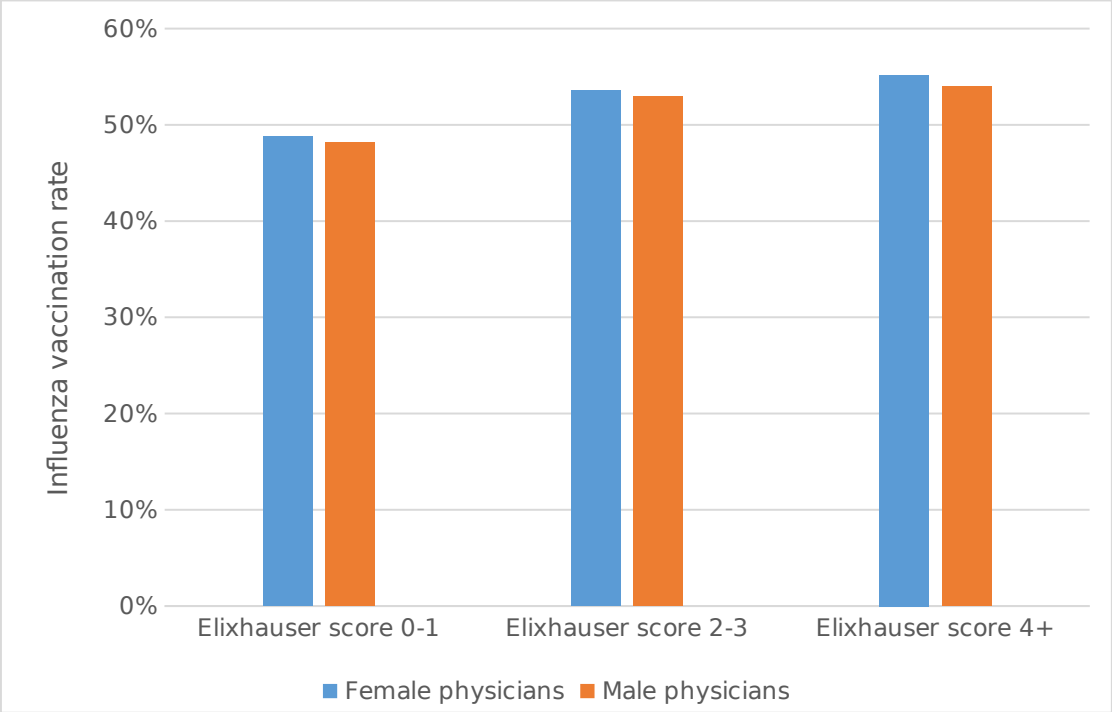
Figure 1: Influenza vaccination rate by physician sex and patient race-sex subgroup, 2006-2016



Note: Author's calculation using Medicare data from 2006-2016. The bands in the graph and the values in parentheses are 95 percent confidence intervals. Adjusted vaccination rates using marginal standardization (also known as predictive margins)

are reported. The multivariable linear regression underlying these results is the binary outcome of influenza vaccination as a function of physician sex, patient race-sex subgroup, the interaction physician sex and patient race-sex subgroup, patient age, Medicaid dual-eligibility, share of months receiving the Part D low-income subsidy, original reason for Medicare being disability, Elixhauser comorbidity score, number of years a patient had a physician as outpatient provider, patient zip code fixed effects, physician medical school graduation year, outpatient practice fixed effects, and year fixed effects. Standard errors were clustered at the outpatient practice level. Race and ethnicity were self-reported. Elixhauser Comorbidity software identifies up to 31 patient comorbidities, such as hypertension and diabetes, based on diagnosis codes found in administrative data, and the Elixhauser comorbidity score is the sum of these comorbidities.

Figure 2: Influenza vaccination rate by physician sex and patient Elixhauser comorbidity score, 2006-2016



Note: Author's calculation using Medicare data from 2006-2016. The bands in the graph and the values in parentheses are 95 percent confidence intervals. Adjusted

vaccination rates using marginal standardization (also known as predictive margins) are reported. The multivariable linear regression underlying these results is the binary outcome of influenza vaccination as a function of physician sex, Elixhauser comorbidity score category (0-1, 2-3, 4+), the interaction between physician sex and Elixhauser comorbidity score category, patient race-sex subgroup, patient age, Medicaid dual-eligibility, share of months receiving the Part D low-income subsidy, original reason for Medicare being disability, number of years a patient had a physician as outpatient provider, patient zip code fixed effects, physician medical school graduation year, outpatient practice fixed effects, and year fixed effects. Standard errors were clustered at the outpatient practice level. Race and ethnicity were self-reported. Elixhauser Comorbidity software identifies up to 31 patient comorbidities, such as hypertension and diabetes, based on diagnosis codes found in administrative data, and the Elixhauser comorbidity score is the sum of these comorbidities.